TOTAL OPERATIONAL WEATHER READINESS – SATELLITES (TOWR-S) PROJECT

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Motivation & Methodology

Evaluate the operational viability of next-generation satellite data and systems in support of NWS forecast and warning missions.

User Readiness for GOES-R and JPSS is dynamic and involves several activities, including:

- **AWIPS-II development**
- **NWS Integrated Dissemination Program development**
- **NESDIS data processing and dissemination changes**
- **WFO/National Center forecaster training**

***Approach*: Begin with the forecaster and work backward to satellites**

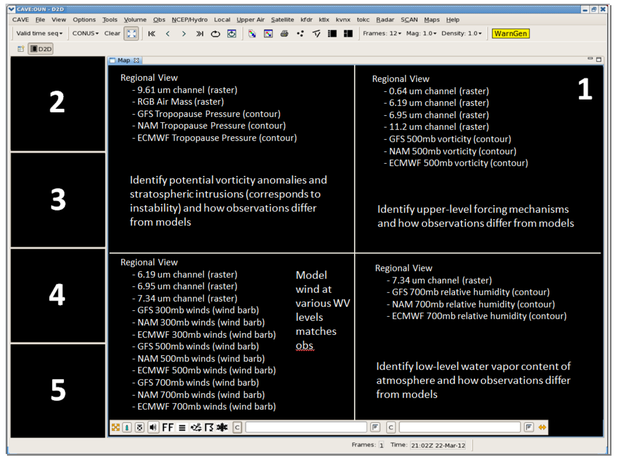
NWS forecast and warning mission areas are defined in the NWS Directives. A representative sample of Use Cases were extracted from 267 documents and categorized by Mission Service Areas (MSA) for integration into the TOWR-S project. TOWR-S partners are located country-wide and represent a broad NWS forecaster base. *Because of organizational diversity within each mission area, the NWS Virtual Lab is TOWR-S' primary coordination tool.*

Use Case	NWS Directive	MSA	NWS Partner
Severe Thunderstorm Warning	NWSI 10-511	Severe Weather	WFO Charleston
Red Flag Warning	NWSI 10-401	Fire Weather	WFO Eureka
Hurricane and Tropical Storm Warning	NWSI 10-601	Hurricanes and Tropical Storms	National Hurricane Center
Volcanic Ash Advisory	NWSI 10-1501	Aviation Weather and Volcanic Ash	Washington Volcanic Ash Advisory Center
Deterministic Hydrologic Forecast	NWSI 10-922	Hydrology and Water Resources	West Gulf River Forecast Center
Dust Storm Warning	NWSI 10-515	Severe Weather	WFO Albuquerque
High Seas Forecast	NWSI 10-311	Marine Weather & Coastal Events	Ocean Prediction Center
Terminal Aerodrome Forecast (TAF)	NWSI 10-813	Aviation Weather and Volcanic Ash	WFO Honolulu
Convective Sigmet	NWSI 10-811	Aviation Weather and Volcanic Ash	Aviation Weather Center
Severe Thunderstorm Watch	NWSI 10-512	Severe Weather	Storm Prediction Center
Flash Flood Warning	NWSI 19-922	Severe Weather	TBD
Dense Fog Advisory	NWSI 10-515	Severe Weather	TBD
Extreme Wind Warning	NWSI 10-601	Severe Weather	TBD
Special Marine Warning	NWSI 10-313	Marine Weather & Coastal Events	TBD
Dense Smoke Advisory	NWSI 10-515	Severe Weather	TBD

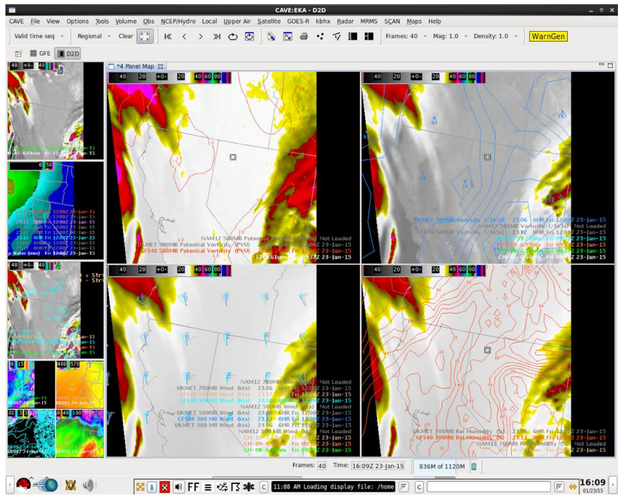
List of in-work (green) and potential (blue) use cases for TOWR-S

Test Development Activities

TOWR-S partners at various WFOs/RFCs and National Centers create mock AWIPS-II diagrams incorporating GOES-R and JPSS imagery and derived products, in addition to model/radar data that will enable them to best execute their forecast and warning Use Case. TOWR-S turns these diagrams into notional AWIPS-II procedures.



Notional AWIPS-II D2-D diagram for Red Flag Warning Use Case



4-panel display of a notional AWIPS-II D2-D procedure containing RaFTR-generated GOES-R data.

The Resample and Format: Timed Release (RaFTR) GOES-R simulator software was created to send simulated GOES-R NetCDF files to AWIPS-II. 16 bands of imagery are created by the University of Wisconsin using the WRF model over CONUS and the GFS model elsewhere. RaFTR formats the data to be compliant with the GOES-R Ground Segment to AWIPS ICD, and interpolates the data to the cadence (in real-time) that GOES-R will sample Earth. *RaFTR data is suitable for some GOES-R training at the synoptic scale*.

Results & Future Plans

In January 2015, Internal AWIPS Test #3 took place at NWS Headquarters in Silver Spring, MD. SOOs from WFO Charleston and WFO Eureka tested their AWIPS-II GOES-R procedures in real-time and identified potential issues relating to usability of GOES-R data with current AWIPS-II functionality.

The GOES-R Program will perform several Data Operations Exercises (DOEs). DOE-4 is of particular interest because it will be the first end-to-end test with the following objectives:

- ✓ **Ingest cloud and moisture imagery at the Wallops Command and Data Acquisition Center (WCDAS) and flow it through the NWS National Control Facility (NCF)**
- ✓ **Create derived products at the NOAA Satellite Operations Facility (NSOF) and flow it through the NCF via Product Distribution and Access (PDA)**
- ✓ **Send data over the NWS Satellite Broadcast Network (SBN) to individual AWIPS-II terminals at WFOs & National Centers**

Internal AWIPS Test #4 is scheduled for April 2015 and will act as a "dry run" for DOE-4. Derived products and additional procedures will be evaluated during this time, with the objective to flow data over the NWS SBN to WFOs.

Event	Date	Purpose	Status
AWIPS Test #3	Jan 20 – 23 2015	Stress testing of Severe Thunderstorm Warning and Red Flag Warning A2 Procedures, Himawari simulated imagery	Complete
Satellite Science Week Meeting	Feb 23-27 2015	Side meeting - NWS Operational & Training Participation exploitation planning for upcoming tests	Planned
AWIPS Test #4	April 20 – 24 2015	Stress testing of additional A2 Procedures including GOES-R baseline products...planned use case expansion to relevant SNPP/JPSS data	Planned
Proving Ground Meeting	June 15-19 2015	Detailed planning for DOE-4 exploitation integrated across agenda	Planned
DOE – 4	Sept 10 – Oct 16 2015	Full end-to-end data flow test from GOES-R Ground Segment to AWIPS-2 terminals at participating stakeholder locations (WFOs, National Centers, etc)	Planned
Post DOE & GOES-R OT&E TOWR activities	2016	Focused enhancements in AWIPS, integration of Direct Broadcast capabilities, CONOPS development, further enhancements of capabilities into NWS operations	TBD

Schedule of events with TOWR-S participation

The TOWR-S project provides a unique user readiness opportunity for NWS by tracing the dataflow back from a particular NWS forecast and warning mission. The GOES-R/JPSS satellites represent a paradigm shift in operational satellite meteorology that requires much infrastructure coordination and forecaster training to ensure user readiness. This need is being facilitated by the TOWR-S project.

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